# GARDEN AND FOREST.

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TABLE OF CONTENTS.


| | PAGE. |
|---|---|
| EDITORIAL ARTICLE:—The Forests on the National Domain | 51 |
| Fructification of the Cork Oak.—*C. E. Faxon.* | 52 |
| The White Elm in the West.—*Professor Charles A. Keffer.* | 53 |
| FOREIGN CORRESPONDENCE:—London Letter.—*W. Watson.* | 53 |
| NEW OR LITTLE-KNOWN PLANTS:—Gunnera manicata. (With figure.)—*W. W.* | 54 |
| PLANT NOTES | 55 |
| CULTURAL DEPARTMENT:—Treatment of Amaryllis.—*E. O. Orpet.* | 56 |
| Sweet Potatoes from Slip Seed.—*Professor M. H. Beckwith.* | 57 |
| Chinese Primroses.—*E. O. Orpet.* | 57 |
| MEETINGS OF SOCIETIES:—Nebraska State Horticultural Society.—II | 57 |
| Western New York Horticultural Society.—II | 58 |
| NOTES | 60 |
| ILLUSTRATIONS:—Gunnera manicata, in Cornwall, England, Fig. 8 | 55 |


## The Forests on the National Domain.

WHAT is to be the fate of forests on the national domain, and how is the much larger forest area of the country, now in private hands, to be managed in the future, are questions which, a few years ago, would have excited but trifling interest anywhere in the United States. The current issue of *The Century* magazine shows that these matters are now subjects of serious study by many thoughtful Americans. The editor of a great periodical is a good judge of what subjects are of immediate popular interest, and the fact that *The Century* not only makes a distinct proposition of its own for action in the matter of forest-preservation, but devotes ten pages to setting forth the views of persons who, from their official standing or personal knowledge, are qualified to say something worth hearing on the subject, is an evidence that we are gradually nearing the time when indifference and lethargy in relation to this matter will give place to an active realization of the fact that the prosperity of our country is directly connected with the proper management of our forests.

Six years ago, when speaking of the nation's forests, it was urged in this journal that all forest-lands belonging to the Government should be withheld from sale until an examination of these lands, and of the agricultural lands depending upon them for water-supply, would show what tracts of timber could be put upon the market without threatening important interests in the country below them. For the protection of these forests against injury from man and beast, it was advised that, pending this investigation, the guardianship of the forests on the national domain should be entrusted to the United States Army, and that this examination of the national forests should be conducted by a commission, appointed by the President, of men able to report upon the magnitude and quality of our forests, and upon their relations to other interests. No commission was appointed, however; perhaps the time was not ripe for such a plan, modest and moderate as it was; but certainly if such a commission had then been named, we should now know more about our forests than we do. In *The Century* symposium a man so well qualified to speak as Mr. Bowers, the Assistant Commissioner of Public Lands, declares that estimates of the amount of forest-land owned by the Government vary between the lowest and the highest by twenty millions of acres, which means that we have no absolute knowledge whatever. And since no one can do more than make a rough guess at the area of these lands, any surmise as to the amount of timber growing on any portion of them, or of its value, or of the ease or difficulty with which these woodlands can be made permanently productive, would be wilder still. It seems, then, that the need of a board of investigation is quite as urgent to-day as it was when the proposition was first made, and *The Century* now advocates the creation of a commission, composed of men whose reputation will give their recommendations weight, and whose duties shall be to study the whole question of forest-preservation, and report fully upon it to Congress.

Such action need not interfere with any other legislation, for the first thing to be done under any scheme would be to get more knowledge, and no better way of obtaining information about our forests can be devised than that of sending competent men to the ground to examine them. *The Century* also revives the other recommendation that until this report is made all forest-lands should be withheld from sale. And why not? No private interest can suffer by such a delay. No one has an inalienable right to demand that the Government shall sell him a wood-lot. It is true that there are delicate questions involved in the necessities of pioneers, who need wood for fuel or timber for mines. This is one of the very points which such a commission should be called upon to study, and certainly it would not be unwise for the Government to hold fast to all its lands until they could be disposed of more intelligently.

There seems to be little question as to the advisability of employing the army as a police force while this investigation goes on. Captain Anderson, who has been in command of the troops in the Yellowstone National Park, ought to be a competent judge in this matter, and in his contribution to the symposium it is stated that the soldiers of his command have served every purpose of a forest-guard most satisfactorily. There have been suggestions about lectures on forestry in West Point, with an experimental forest-reservation on the Highlands, but upon these points there are differences of opinion. It is admitted that there would be an advantage in giving officers of the army a brief course of forest-study, and there are objections to the plan which it is not necessary to state, but there seems to be no question that the army is the one body now properly organized to take charge of our forest-reservations, to protect them from fire and trespassers and to execute any regulations imposed upon them by Congress. Such police work does not need any exhaustive knowledge of forestry, and undoubtedly the army as it is can protect the reservations and all the national forests as thoroughly as they have protected Yellowstone Park. Of course, this service would only be temporary, for the time is coming when a policy, which only means mere protection of the woods from timber thieves and browsing animals and fire, must be replaced by an active system of reproductive management such as is used in other industries of this country and in the forests of other civilized nations.

It is to be hoped that the press of the country will unite with *The Century* in this recommendation to Congress. No one doubts that something ought to be done, and done now. No one has suggested anything that will cause less disturbance, and which, with so small an outlay, promises so much. No elaborate machinery is called for, no large appropriation. Congress is simply asked to help secure the knowledge which is needed before an intelligent and consistent scheme can be devised for managing this great property which is now wasting so rapidly away before our eyes. Of course, we must ultimately have some comprehensive system of forest-management. No such system can be carried into execution, however, unless it is based

upon consenting and upholding public opinion, and we can imagine no better means of creating this prevailing sentiment than the publication of such a report as is contemplated. It will be a long time before the country will be prepared for any system of forestry which will need the supervision in all its details of persons skilled in the refinements of the highest scientific practice. But we must begin right. Mr. Fernow very properly insists that our first need is common-sense treatment of our natural woods. But common-sense treatment is what our woods have never had, and they never will have such treatment until the people are instructed in the elementary principles of sound forestry. The inauguration of a common-sense policy will only come from the teaching and example of those who are masters of the whole subject, and who foresee that the great advantage of such a policy is that it will be a broad-set foundation for more scientific and rational practice. We need the very best of counsel at the outset, and the more thoroughly the problem is studied now the more certainly shall we avoid fundamental mistakes which it would be the work of years to correct.

## Fructification of the Cork Oak.

IN Professor Coutinho's valuable paper on the Oaks of Portugal* there are some interesting statements regarding the fructification of the Cork Oak, Quercus Suber, which has been generally considered as an annual fruiting species, but which in certain localities in Portugal is found to produce both annual and biennial fruit. It would be interesting to learn whether any of the native species on our southern seaboard ever behave in a like manner. The only analogous case, so far as I am aware, is that of Q. myrtifolia, a normally biennial fruiting species, which Dr. Mellichamp finds producing annual fruit plentifully at Bluffton, South Carolina. With the object of drawing the attention of our students of Oaks to this subject I translate the following extracts from Professor Coutinho's paper:

The flowering of the Cork-tree is with us subcontinuous. It is most abundant from April to July, but occurs in almost all the other months, and appears to be interrupted only by the extreme heat of summer or cold of winter. Maturation takes place from August to February, the fruit ordinarily falling in three more or less distinct crops—the first, which our farmers call "bastão," in September and October; the second, called "lande," in November, and the third, which constitutes the "landisco," or "lande serodia," in December and January. It should be remarked that most of the time these fruits are inserted in shoots bearing leaves of the year, and are evidently produced and developed in a single season, but in some cases the fruits produced from the last flowers of autumn or winter, not meeting then the warmth necessary for maturing, pass the winter in an undeveloped condition, and only ripen in the following spring or summer after the growth of new shoots, appearing then mature on the woody branchlet of the previous year, which may be at that time furnished with or bare of leaves. This fact appears due more to particular weather conditions than to an especial organization of the trees in which it occurs; in short, it is not constant with a given individual, nor is it exclusive, the same individual being able to produce fruits plainly annual.

* * * * *

Many botanists consider the Cork Oaks of Europe as belonging to two species, one chiefly characterized by annual fructification and the persistence of the leaves for two or three years (Quercus Suber, L.), the other by biennial fructification and annual persistence of the leaves (Q. occidentalis, Gay).

Recent botanists and silviculturists have frequently discussed the existence of Quercus occidentalis in the Peninsula, and some have even doubted its being a good species. Brotero, in the *Flora Lusitanica*, includes all the Portuguese Cork Oaks in the Linnæan species, Q. Suber, and makes no remark about the maturation of the fruit and persistence of the leaves of these trees. Later, Dr. Welwitsch considered the Cork-trees of Cintra as belonging to Q. occidentalis, and the specimens sent to France, and studied by Gay himself, were determined by him as belonging to his new species, and as such cited in De Candolle's *Prodromus*. Lastly, Sr. Barros-Gomes disputed this assertion, affirming that the Cork Oaks of Cintra belong to the Linnæan species, and denying that Q. occidentalis should be considered a good species. We transcribe the principal reasons he adduced:

"The Cork-tree of Cintra collected by Welwitsch, and determined as Quercus occidentalis by the followers of the new classification, does not have fruit more biennial in appearance than many others, in which there is no doubt of its being in fact annual, and only apparently biennial. It is very common in Portugal to find an apparent biennial maturation of fruit that is really annual, because the growth of the Cork-tree with us often admits the formation of one, two, or even three new growths in a single year, exactly as occurs in the common Oak, Q. pedunculata.

"The prolonged flowering of the Cork-tree, commencing in April, hardly ceases during the dry season, and is renewed with the first rains of autumn, giving rise to two or three successive crops of acorns, the last of which matures in January. It is often accompanied with successive new growths and partial falling of the leaves of the year, so that the lower branches, only a few months old, become bare, and have the biennial appearance to which we refer. In the common Oak, whose foliage is wholly annual, fruit is found apparently biennial by insertion, and, nevertheless, plainly annual by the coexistence of leaves with the same insertion.

"The foliage of the Portuguese Cork-tree, with annual fruit, is not persistent, as a rule, during two or three years, as Mathieu affirms of the species he describes as Quercus Suber, nor by any means is it always annual as in the one he calls Q. occidentalis, but it varies with the meteorological behavior of each year or with local conditions, in some years wholly falling, in others persisting more than one and sometimes two years.

"It does not appear that our Cork-trees, even those of Cintra, have from January to April acorns in immature condition." (*Condic. Flores. de Port.*, pp. 56, 57.)

Contrary to the last statement of Sr. Barros-Gomes, we found in 1886, toward the end of February, living fruit but little developed on specimens gathered near S. Thiago de Cacem, fruit evidently produced the previous season, and which could only mature in the season to come. With this fact was correlated a very peculiar form of the scales of the cup exactly agreeing with the Cork-trees of Cintra, identified as Quercus occidentalis by Welwitsch and by Gay himself. Furthermore, the existence of some bundles in the central parenchyma bounded by the arc of the fibro-vascular bundles of the petiole, was observed, like those which occur in the trees of Cintra, and which, according to De Candolle, is peculiar to Q. occidentalis, not being found in Q. Suber. These reasons led us to affirm the existence of Q. occidentalis in Portugal in our *Esboço de uma Flora Lenhosa*, lately published.

To-day, however, after a careful study of very numerous specimens, living and dried, from many parts of the country, we are obliged to greatly modify our former opinion and have arrived at the following conclusions:

1. The Cork Oak in our climate has an almost continuous flowering, as Sr. Barros-Gomes well says. We have seen specimens in flower (living or dried) in the months of January, February, April, May, June, July, September, October, November and December.

2. With this almost uninterrupted flowering there is a corresponding fructification similarly uninterrupted from the end of August till February. It is to be noted—a fact not found in our other Portuguese Oaks—that it is common to find on the same branch fruit in very different degrees of development; for example, a mature fruit in the axil of one leaf, and very small fruit, hardly formed, in the axil of a higher leaf.

3. The last fruits formed before the cold weather may persist through the winter and develop the following spring or summer. We have seen specimens in this state (with very small living fruit, from December to March) from S. Thiago de Cacem (above referred to), from Cintra, from Coimbra, from Portello and from Alemtejo. These fruits are produced in one season and grow and ripen during the following one, contrary to the statement of Sr. Barros-Gomes.

4. It is certain that the Cork-tree frequently makes two growths in one year, but we consider it quite easy in this case to distinguish the false biennial insertion of the fruit. When the tree makes two growths in a single year, the second or summer shoot is more pubescent, less woody, with narrower leaves, and has thus a characteristic appearance.

5. These biennial fruits are not constant in certain trees, but appear or not according to localities or seasons, and on the same trees annual fruits may be developed also. In proof of this assertion we will say that in the end of last February,

* Os Quercus de Portugal. *Boletim da Sociedade Broteriana*, vol. vi. Coimbra, 1888.

while examining carefully the Cork-trees of Cintra, which usually fruit abundantly, we found very few biennial fruits, and on the same branches we saw the cups of fallen acorns with annual insertion. We will add that in Welwitsch's specimens, collected at Cintra, many are found with mature annual fruit, to one of which he affixed the following note: "Probabiliter nil nisi forma Q. Suberis, L., squamis cupularum plus minus hebetatis. Fructus pleniter maturi et alii sat juveniles, nec non fructus maturescentes saepius in uno eodemque pedunculo inveniuntur!!" We will add, moreover, that we examined from Coimbra, whence we had numerous biennial specimens, some others perfectly identical, with annual fruit, and Sr. Moller, at our request, examining again (the end of February) these trees, found very few biennial fruits, this apparently not being a common occurrence there.

6. It is no wonder that in certain places of great humidity, as Cintra, Coimbra, etc., the Cork Oak has an almost continuous growth and easily produces biennial fruit. It is also in such places that other species of the genus Quercus (Q. Lusitanica, Q. humilis, Q. pedunculata) frequently make (especially the first) two new growths, an indication of more continuous vegetation.

7. It is worthy of note that in various parts of the country it is said that certain men experienced in rural affairs know in winter whether the following year will be abundant in "bastão" (the first crop of acorns) by the presence of very small fruit, which, in this condition, they alone recognize. This fact appears to confirm the accidental presence or absence of fruit in the process of biennial maturation.

8. From what we have said, the maturation of the Portuguese Cork-tree cannot be said to be strictly either annual or biennial, but rather sub-continuous, hardly interrupted by the cold of winter; and for this reason it is impossible to base specific distinctions on the differences of this maturation.

In the same paper there is an interesting account of the hybrid Oaks thus far detected in Portugal. Among the eight indigenous species, four of these supposed hybrids have been found.

Arnold Arboretum. *C. E. Faxon.*

## The White Elm in the West.

THE Elm is one of several trees that are invariably recommended for planting in the west, but for which hardly any economic use is known. The timber is tough and hard, and is used in making wheels and saddle-trees, but its use about the farm is limited, as it is not durable in contact with the soil, and it is very difficult to season. Too much can hardly be said of its beauty of form, but in close forest-growth this is of small importance. It is native as far west as central Kansas, and a little farther in Nebraska. It endures low temperature well, and large specimens are found along the Red River in North Dakota. Although its habitat is always near streams or lakes, where its roots have a constant water-supply, it makes better growth in dry situations than many other species, and is altogether superior for high land to Black Walnut and Cottonwood. Thus far it has been quite free from insect pests in the west, but it can hardly hope to escape the destructive beetle that is defoliating the Elms throughout the east. In South Dakota cut-worms often cause great damage to seedlings, and they even climb into two and three year old trees and eat off their leaves. The larva of the emperor moth also attacks the foliage.

In rapidity of growth the Elm is one of our most satisfactory hard woods. In the South Dakota Agricultural College plantations, at Brookings, White Elm planted with Box Elder six years ago now equals the Box Elder in height, though for the first three years the latter tree grew the more rapidly. In a plat of hard woods, White Birch grew most rapidly, then White Elm, Black Wild Cherry and Green Ash, with but little difference between the three first named. At Hutchinson, Kansas, in the railroad plantation, now about twenty-four years old, White Elm and Cottonwood were planted in alternate rows. The Cottonwoods now stand from fifty to sixty feet high, and the Elms are completely overtopped, being scarcely thirty feet high, and making feeble growth.

In another part of the plantation, where their neighbors are Honey Locusts and Silver Maples, they are doing very much better. The Elm is a light-demanding tree, and does not succeed where overtopped by other species. At Farlington, Kansas, an Elm that has evidently sprung from seed in a plantation of Catalpa speciosa has outstripped the Catalpa both in height and diameter. No Elms were included in this plantation, and comparisons cannot be given. The trees at Brookings stand in a rich loam above stiff clay, and those at Hutchinson are in the sandy loam of the Arkansas valley, with water within ten to twelve feet of the surface—an ideal soil for the Elm.

Several of the newer streets in Denver, Colorado, are planted with White Elm, and under irrigation the trees fully equal the best growth observed in the east.

Washington. *Charles A. Keffer.*

## Foreign Correspondence.

### London Letter.

DENDROBIUM WATTII.—This plant first flowered at Kew in October, 1882, soon after it had been received from Dr. Watt, the Indian botanist, who found it in Munipore. It was figured and described by Sir Joseph Hooker in the *Botanical Magazine*, t. 6715, under the name of Dendrobium cariniferum, var. Wattii. In 1888 Professor Reichenbach elevated it to the rank of a species because of its differing from D. cariniferum in having slenderer stems, narrower leaves, larger flowers and a terete, not triquetrous, ovary. Sir Trevor Lawrence exhibited it in flower this week, and it was awarded a botanical certificate, although it merited the highest award. The flowers are borne in pairs on short racemes, and there are six or eight flowers on the apex of each stem; these are two inches across, pure glistening white, with streaks and a blotch of deep yellow on the front of the labellum. In effect the flowers are equal to those of D. infundibulum (Janesianum), and nearly as fine as D. formosum, to which D. Wattii is closely allied.

SACCOLABIUM MOOREANUM.—This is a pretty little Orchid which we owe to Messrs. F. Sander & Co., who introduced it from New Guinea along with Dendrobium Phalænopsis, and with whom it flowered in October, 1892. It is named in compliment to Mr. F. Moore, the keeper of the Glasnevin Botanical Gardens, where there is an exceptionally rich collection of Orchids. Two plants of it are now in bloom at Kew—one, the type, having rose-purple flowers, the other, white flowers. The plant is less than six inches high, with distichous leaves, four to six inches long by an inch in width, the apex bilobed. The scape is horizontal, six inches long, bearing a conical raceme, two inches long, of crowded small flowers, which in the type are a pleasing shade of rose-purple, the segments tipped with bright green, while in the variety they are milk-white, with green tips. As a garden-plant this species takes rank with such Orchids as Saccolabium ampullaceum, S. Hendersonianum, Phalænopsis Parishii, Masdevallia triglochin and similar diminutive, but charming as well as interesting things.

MORMODES ROLFEANUM is handsome enough to be classed with good garden Orchids. It was introduced four years ago from Peru by Monsieur Linden, and named by him in compliment to Mr. Rolfe, of Kew. There is a colored plate of it in *Lindenia*, 1891, t. 289, and there is a plant of it in flower at Kew now. It has a two-flowered scape six inches long, and the flowers are as large as those of Mormodes luxatum, but colored tawny yellow, shaded with green on the sepals and petals, while the twisted lip is colored apricot-red. All the Mormodes, with their cousins, the Catasetums and Cycnoches, are worthy of cultivation, but, as a rule, they do not like to be cultivated; at any rate, they are rarely seen in good condition after they have had about two years of artificial treatment. They do best when grown in baskets suspended near the glass in a hot moist house till they have finished their growth, when they should be placed in a drier, airy house and rested thoroughly till the growing season comes round again. Of course, they grow in summer and rest in winter—that is, when they behave properly.

Phalænopsis F. L. Ames.—I lately saw a flower-scape of this fine Orchid which measured eighteen inches in length and bore sixteen flowers and buds, which had been grown in the garden of Lord Rothschild, at Tring. Messrs. J. Veitch & Sons created this hybrid by crossing Phalænopsis amabilis with P. intermedia, and first flowered in 1888, when it was named "in compliment to the late Hon. F. L. Ames, of North Easton, Massachusetts, a liberal patron of horticulture and the possessor of one of the finest Orchid collections in cultivation." The flowers are as large as those of an ordinary variety of P. amabilis, measuring three inches in diameter, and they are white, except the lip, which is lined and shaded with salmon-red. This peculiar color, together with the form of the lip, are the only marked indications of the other parent, P. intermedia, itself a hybrid from P. rosea and P. aphrodite; or, to be precise, a plant raised from these two by Messrs. Veitch, and flowered in 1886, proved to be the same as the P. intermedia introduced by Messrs. Veitch from the Philippines, and named by Lindley in 1853.

Pleurothallis scapha.—There are about four hundred species of Pleurothallis, and there are not four that are considered worthy of cultivation. I know three—Pleurothallis Roezlii, P. insignis and P. scapha. The first named of this trio has nodding racemes of purple-red flowers, each over an inch long, and has been in cultivation about ten years. P. insignis, which differs from P. scapha only in having a bearded lip, first flowered at Kew in 1887. P. scapha was named by Reichenbach in 1874 from a plant in the collection of the late Mr. John Day. There is a good example of it in flower now in the cool Orchid-house at Kew. This plant is about a foot high, with ovate oblong leaf-blades and slender scapes, from six to nine inches long each, bearing five to seven flowers, which are remarkable for the length of their filiform segments; they are three inches long, and colored dull creamy white, tinged and streaked with dull crimson. The lip is small, glabrous, with the lateral lobes curiously twisted over the front lobe. It is difficult to describe the flowers intelligibly, but they may be said to resemble the insect known as daddy-long-legs.

Vanda Kimballiana.—There is an illustration of an exceptionally well-flowered group of this fine Vanda in *The Gardeners' Chronicle* this week, and it teaches a lesson worthy of the attention of the Orchid-grower who does not know that this plant does best when grown in a cool house. In Messrs. Low & Co.'s nursery at Clapton, where it is grown in quantity and grown well, it is placed along with Odontoglossum crispum, except during winter, when it is put into a Cattleya house. If treated as a tropical Orchid it soon succumbs to thrips and damp. The grower of the group of plants mentioned above, Major Mason, says he grows them at the coolest end of a warm house in baskets suspended near the roof glass. They are planted in sphagnum and crocks and they grow in a marvelous manner. It is one of the handsomest of the smaller species of Vanda. It has subcylindric leaves and scapes a foot or more long, bearing from six to twelve flowers, each two inches across, white, with an amethyst lip.

Cypripedium Henry Graves was exhibited at the last meeting of the Royal Horticultural Society, having been brought in flower by Mr. Dimmock from Mr. Graves' garden in New Jersey, where it was raised from C. Lawrencianum crossed with C. Marshallianum. It obtained an award of merit on account of the singular form of its dorsal sepal and its color, which is apricot-yellow, with rosy dots. Cypripedium Mrs. Fred. Hardy, a hybrid between C. superbiens and C. bellatulum; Madame G. Truffaut, a hybrid between C. ciliolare and C. Stonei; and Cypripedium J. H. Berry, from C. Harrisianum and C. concolor, were exhibited by Messrs. F. Sander & Co., the raisers, and were considered worthy of the award of merit. Two other certificated hybrid Cypripediums, shown by Messrs. J. Veitch & Sons, were C. mimosa superba, raised from C. Spicerianum and C. Arthurianum, and C. Norma, a hybrid between C. Niobe and C. Spicerianum. These "pedigree" Orchids are nuisances, in a literary sense at any rate.

Lælia purpurata.—This Orchid must be still growing in immense quantities in its haunts, the woods of Santa Catherina, for, during the last twenty years at any rate, it has been imported by myriads, and still they come. Next week one nursery firm offers to sell by auction "seventy cases of L. purpurata, large plants in grand condition," and another offers one thousand grand masses of it to be sold without reserve. A good variety of this Lælia is a superb Orchid, but it varies a great deal, and one too often meets with forms that are thin and spidery in form and poor in color.

Lælia autumnalis is also very abundant in England now, large importations of it having recently arrived. I saw thousands of fine, healthy masses of it in a nursery near London a few weeks ago. This, too, is an Orchid of great merit; indeed, it and its ally, L. anceps, are unsurpassed in the genus, considering them from all points. They are easily grown, they flower freely and their flowers are beautiful.

William Thompson, the famous Scotch gardener, nurseryman, and author of several classical horticultural works, died on the 12th ult. at Clovenfords, after a short illness brought on by a fall. He was in his eighty-first year. Thompson, of Clovenfords, formerly Thompson, of Dalkeith, was as prominent a figure in the horticultural world as Hooker, of Kew, or Gray, of Harvard, in the realms of botany. To quote from the editorial notice in *The Gardeners' Chronicle*, "He was a prince among gardeners, of stately mien, and of great tact, using his influence at all times for the advancement of gardeners and gardening. He was a man of strong common sense, thoroughly practical in all his ways and his teachings." He worked in private gardens till 1871, when he started as a nurseryman at Clovenfords, where he grew grapes largely, and latterly Orchids. His book, *A Practical Treatise on the Cultivation of the Grape-vine*, is a standard work with vine-growers.

London. *W. Watson.*

## New or Little-known Plants.

### Gunnera manicata.

ENGLISH horticulturists who have an eye for noble foliage-plants available for outdoor effects do not fail to make use of the two big-leaved Gunneras, namely, G. scabra and G. manicata. They are not exactly hardy here, except in the warmer parts of the country, for even at Kew they require protection in severe weather and from cold winds in spring. But in such favored places as the south of Ireland, South Wales, Devon and Cornwall, they are quite at home and grow to an enormous size.

The view represented in the accompanying picture is in the garden of Mr. Pendennis Vivian, at St. Martin, Cornwall. The value of the Gunnera in the garden is here shown exceedingly well. Nothing could be finer than the effect it produces by the side of a lake with Arundo, Gynerium, Bamboo, Richardia and other moisture-loving plants as its companions.

Mr. Vivian writes that the Gunnera was twelve feet high when the photograph was taken, and as the leaves are probably fully ten feet in diameter, the magnificent appearance of this specimen, in its beautiful setting of feathery foliage, is easily imagined. I have seen great masses of this Gunnera in some parts of Ireland, where the leaf-stalks were high enough to enable a tall man to walk erect among them without touching the blades. In the garden of the late Sir George Macleay, at Pendell Court, in Surrey, there used to be a very fine specimen of it growing on the edge of the lawn, where it dipped to the lake. Gunneras must be planted in such a position if they are to do well. A sheltered place, near water, where the soil is deep and rich, and where the sun can shine upon the plant all day is the right position for both G. manicata and G. scabra.

The history of Gunnera manicata was told by Mr. J. G. Baker in the *Gardeners' Chronicle* in 1886. It was discov-

ered in southern Brazil by Libon in 1865 and distributed by Linden, the Belgian nurseryman, in 1867.

It differs from Gunnera scabra, which is a native of Chili and Bolivia, in being more robust, with broader, more elegant and more spiny leaves and in having much taller flower-spikes. Where there is room for both, both are worth growing, but if only one Gunnera is wanted, then G. manicata is to be preferred. According to Mr. Baker, G. chilensis is an older name for the plant generally known as G. scabra, which has been in cultivation since 1849. I have seen the Kew specimen of this a mass of big leaves fifteen feet through and eight feet high, the leaf-blades being over four feet across. This, however, is dwarfed by a specimen of G. manicata seen by Mr. Burbidge in County Down, Ireland, which had twenty-five leaves, the stalks as thick as a man's arm and six feet high, the diameter of the whole being thirty-five feet, that of the largest leaf-blade ten feet three inches. In Guernsey there is a long ravine through which a stream runs, and which is entirely filled with this Gunnera, it having become naturalized there.

London. *W. W.*

Fig. 8.—Gunnera manicata, in Cornwall, England.—See page 54.

## Plant Notes.

PICEA ORIENTALIS.—Of the evergreen trees from foreign countries that have been planted in the northern Atlantic states, no other, perhaps, is so full of promise as a permanent inhabitant of our parks and gardens as this species. The Oriental Spruce is a large and common tree in many countries adjacent to the Black Sea, or the Anti-Lebanon, on the high mountains of Imeretia, in upper Mangrelea, and other parts of the Orient, where it replaces the Spruce of central and northern Europe, and often forms vast forests. From other Spruce-trees it may be distinguished by its more slender branches and by their dark green crowded leaves that cover them. The habit of cultivated trees as they appear in this country is particularly graceful and attractive; the long upward sweep of the lower branches and the spray-like branchlets standing out freely from the dark body of the tree and allowing opportunity for a free play of lights and shadows, give a charm to the Oriental Spruce which no other hardy Spruce-tree possesses, and at once attracts the eye and excites the imagination. The first Oriental Spruces planted in the United States are thirty or forty years old, and are now more than fifty feet tall, so that while we do not know it yet in its adult state, and cannot determine whether old trees will be as beautiful and satisfactory as young ones have proved to be, it is safe to say that this tree is perfectly hardy from Boston to Philadelphia, and that it will retain its beauty for half a century at least. Of rather less rapid growth than the Norway Spruce and several of our American species, it is particularly suited to decorate lawns and small pleasure-grounds, and it is remarkable that it is so little known and so rarely planted. Good specimens of the Oriental Spruce can be seen in Central Park in this city, and there are several unusually fine ones in Prospect Park, Brooklyn. One of the oldest and best of these trees in the country stands on the grounds of Mrs. Rufus Leavitt, at Flushing, Long Island, and, of course, there are good trees in the collection of Mr.

Josiah Hoopes, at West Chester, Pennsylvania; at Wodenethe, Fishkill-on-Hudson, and in Mr. Hunnewell's Pinetum at Wellesley, Massachusetts.

Hibiscus Syriacus.—The best forms of this interesting and very variable shrub are not always planted in gardens. Many of the forms seen in northern gardens are those with double or semi-double flowers of mixed colors. These are somewhat more lasting than the single-flowered varieties if the length of time that individual flowers remain in good showy condition is considered. The single-flowered original species and its single varieties are, however, much more desirable, as they are more purely beautiful. The species varies greatly in the color of its flowers, there being white, purple, red and other shades; one of the most interesting has large rosy purple flowers with a crimson centre. These single-flowering plants bear seed in abundance, but it often does not mature well in northern gardens. Seedlings of varieties show some variation, especially where several kinds are growing together, but as a rule a particular variety will reproduce itself from seed. Where it is desired to get the exact counterpart of some particular plant it is best to propagate by layers, by cuttings of green wood taken in right condition in July, or by cuttings of ripe wood taken in the autumn or winter, and stored in moist sand, and started either in the greenhouse or open air. In localities where the Hibiscus is not very hardy it may be planted with the main roots in two opposite directions, and in the autumn the soil at one side of the stem may be removed and the plant bent at right angles to the line of the roots and covered with soil if necessary. Or it can be grown in a tub, and be transferred to the pit or cellar in winter. The greatest horticultural merit of these plants rests in the fact that they are showy late-summer bloomers, keep up a succession of flowers for a long time and thrive in a city atmosphere where many other kinds of shrubs would fail. They will flourish in a great variety of soils and in cold climates, but do best in a dry, rather than a wet, situation.

Clematis indivisa.—We have lately seen long flower-covered stems of this plant used with charming effect in the decoration of the walls of a ballroom. An inhabitant of New Zealand, where it festoons trees and shrubs on the borders of the forest, Clematis indivisa must be grown in the northern states in a cool greenhouse, and succeeds best when planted in a border of well-drained soil and allowed plenty of head-room in which to produce its long flexible branches, which are covered in January or February with axillary panicles, often a foot in length, of flowers two inches or more in diameter when expanded. The beauty of their creamy white sepals is enhanced by contrast with the bright yellow filaments and purple anthers of the stamens. The plant ought to be a real addition to California gardens, where it is probably known, and eastern florists with large houses at command might grow it advantageously for festal decoration, which every year in all American cities makes larger calls upon their skill, resources and taste. An illustration of this plant was given in this journal (vol. vi., page 167).

Cypripedium Sallieri Roeblingii.—As long ago as 1878 a hybrid obtained by fertilizing Cypripedium villosum with the pollen of C. insigne Maulei flowered in England, the cross having been made by Mr. Seden, who succeeded Dominy at this work in the Veitchian Nurseries. Seven years later, or in 1885, another hybrid between C. villosum and C. insigne was raised by Monsieur Godefroy Lebeuf, of Argenteuil, and was named C. Sallieri. According to the laws of nomenclature which now prevail, C. Sallieri ought to rank as a variety of C. nitens. Among the other hybrids obtained by crossing different varieties of these two species the one noted above is conspicuous for its beauty. The seed parent was a fine variety of C. villosum, and the pollen parent was the variety Amesianum of C. insigne. The seed was sown at the United States Nurseries on the second of October, 1890, and it first flowered in November, 1894. The plant has a bold habit, with dark lanceolate leaves about nine inches long and one and a half inches across. The dorsal sepal is large, elongated, recurved at the base. The upper part is white, and the lower portion is yellow, heavily marked and spotted with purple-brown. The petals and pouch are a brownish yellow, the staminode is a bright golden yellow. It seems altogether a very desirable plant, and has been named in honor of C. G. Roebling, Esq., of Trenton, New Jersey.

## Cultural Department.

### Treatment of Amaryllis.

In visits to other gardens it is noticeable that the Amaryllis or Hippeastrum is more generally cultivated than heretofore. This is not surprising when one considers how easily they are grown, and the great improvement that has taken place of recent years in such strains as are sent out by Messrs. Veitch and others. Some visitors who were here recently were most enthusiastic in their praise of the display of Hippeastrums at the Chelsea Nurseries. The question was asked if they did not take a great deal of heat, and it was a surprise to them to find in the coolest house over one hundred flowering bulbs that had been raised from the strain they had admired when in London. We are trying a few this winter in the cellar to see whether it is possible to keep them there when at rest, and the experiment so far seems a success. If they can be kept in a cool cellar after the foliage has died off it will be a great gain of storage-room in the greenhouse.

It has been noted previously that the best way to obtain a good strain of Hippeastrum is to sow seed as soon as it can be had fresh, which is in August. As the germinating power is soon lost, it is best to wait until fresh seed is harvested, when it should be sown as soon as it arrives. If this has already been done, the young bulbs must be grown on without any check until they are two years old. The foliage will then dry off naturally, and the bulbs will be best kept perfectly dry, until there are signs of growth in the early months of the year. We have already picked out a few that were starting to throw up flower-spikes, but the majority of them are still at rest, and will remain so as long as we can keep them dormant, for we want them most during May and later.

After the bulbs reach flowering strength they are as truly deciduous as a Hyacinth, losing both foliage and roots each year. They must of necessity be potted in new soil as soon as signs of growth commence, to avoid check to the young roots just starting out. After potting, a warm greenhouse is all that is needed to keep them growing until the warmer days of spring have come. After flowering we put them in a frame out-of-doors to mature the growth, and give them all the sun and air in summer, since, being natives of South America, our sun in summer is not too much for them, and serves well to ripen and insure a good bloom the next year. It will be seen that it is necessary to grow these bulbs in the greenhouse on stages for three or four months only; the space occupied during that time is not such a great consideration when we take into account the decorative uses of the plants when in bloom. The most suitable soil is one that is rich and porous; we use charcoal freely, and loam, leaf-mold and a little manure, preferably that from the sheep-pasture, seems to suit them best. The bulbs should be potted in the soil to about half of their depth, leaving the upper half uncovered.

Thrips are the only enemies of these plants that seem to trouble the cultivator, and their ravages are soon apparent by the red color of the under sides of the foliage. We use Fir-tree oil to spray with when it is too late to apply tobacco-dust as a preventive; but it is best to keep a sharp watch and take this pest in time, when tobacco will be found an effective remedy.

Amaryllis aulica has been used as one of the parents of some of the garden Amaryllis, with the result of a tendency in the plants to be evergreen. This is a disadvantage if the bulbs have to be stored under the benches, as these need a good light in winter. Many of the evergreen sorts are good, but they are excelled by those that have been obtained from the deciduous species, such as Hippeastrum vittatum, H. equestre and H. reticulatum.

It is too often the case that a plant after it has bloomed is put in some out-of-the-way corner, and left there until the time comes to store it for the winter. But a glance at the bulbs after they have flowered will show that they are shrunken to about half their normal size, indicating loss of tissue. To replace this the plants should be plunged into some material

to keep the roots cool and moist until the time comes to dry them off in fall. A spent hot-bed, old mushroom-bed material, or even leaf-mold, answers well, and there is not so much labor needed to water when the pots are plunged.

We find that very few bulbs need a pot larger than six inches. The young offsets that form after the bulb reaches the flowering size are taken off at each annual potting when they are large enough. Several of these are put in a pot and grown on until they are large enough to bloom. Sometimes an unusually large bulb is put into a seven-inch pot, but the majority are grown in the smaller size, which is sufficiently large and more easily handled than are the larger pots.

South Lancaster, Mass. *E. O. Orpet.*

## Sweet Potatoes from Slip Seed.

IN many parts of the southern states the growers of Irish potatoes find that they have the best success with that crop when second-crop seed is used. The potatoes are planted early in the season, and when mature the tubers are planted and a second crop produced. This second crop, which matures late in the fall, is in great demand for planting the following season, as the tubers produce strong, healthy plants, which yield much more abundantly than do those of the first crop when kept over for seed.

Growers of sweet potatoes in Virginia find that by using what is known as "slip seed" they are able to secure a much larger crop of roots, which are of much better quality than those from the sets ordinarily used. It is also claimed that the use of slip seed produces crops that are free from injury by the disease known as black shank.

Slip seed is grown from cuttings about six inches long taken during the latter part of June or the first of July from the vines in the fields. These cuttings are at once planted in the same manner as are the rooted plants which are used earlier in the season for the main crop. The cuttings produce tubers which compare favorably in size and yield with those grown from sets, and when used as "seed" these tubers produce a greater number of stronger and healthier plants than those grown from rooted plants earlier in the season. The demand for this seed is increasing every year, and the production of this slip seed is becoming quite an industry in many sections.

Experiment Station, Newark, Del. *M. H. Beckwith.*

## Chinese Primroses.

FOR the past two years we have grown for trial and selection a collection of Sutton's well-known strain of Primulas. Each year we have made notes of the kinds as they flowered, so that the best could be selected for our purpose, both as to boldness of stem, large flowers, good colors, and, most important of all, good habit of growth. The first thing noticeable was the failure of the double-flowered kinds to come up to the required standard. The flowers were of good colors, double, and free-blooming, but there was not that individuality about them that we get in the good strains of single flowers. Their use as decorative plants was of correspondingly less value, and we shall in future grow no more of them. Another defect in the so-called giant strains was the sacrifice of other points to the production of very large flowers. The foliage was in nearly every instance coarse and ill-balanced, and the stems rarely carried the flowers erect as in the other strains, owing to their abnormal size.

Of the other sorts we have, however, selected a few that seem to be as near perfection as it is possible to get them. It used to be a recognized fact that Primulas with leaves and stalks of a red tint were sure to bear colored flowers, but this is changed now, and some that have red stems produce pure white flowers of sterling merit. At the top of the list we place Sutton's Purity. This sort has Fern-leaf foliage of a dark purple hue that sets off the large pure white flowers to great advantage. I have never seen flowers of any Primula that can compare with this kind for size, substance and purity, and we shall grow no other white variety, except a few plants of Pearl; the latter is a fine selection of the old variety Alba magnifica, and has similarly green foliage. The pink colors we have sifted down to Rosy Queen, a Fern-leaf, compact-growing and very free-flowering variety that has flowers the color of the Grace Wilder Carnation. It has entirely superseded the older and well-known Reading Pink, owing to its delicacy of color and free growth. Reading Blue is still the best Primula of that shade, and it is of a more decided lavender-blue each year. We have never had this sort so good as during the present season, owing, perhaps, to the cooler temperature in which it was grown. We find that a temperature of forty-five to fifty degrees is better than a higher temperature for the full development of the rich colors and to give substance to the flowers. For a good scarlet we have selected Reading Scarlet as one of the most reliable and the richest-colored. It has, however, the tendency to come into flower early in the fall, and we, therefore, sow it a month later than the other kinds, say at the end of April. The other sorts are sown in March, except the blue one, which is more delicate in constitution and takes longer to develop. It may be sown in January, or early in February, if large plants are desired for next fall.

There are few winter-blooming plants that give more satisfaction than Chinese Primroses, whether for conservatory or house decoration, if a good strain of seeds can be had. Choice Primulas are no more difficult to grow than poor ones, and take no more time and care. We use a light, rich soil at all times, making it a little richer at each potting, until the plants are in the pots they are to flower in. A five-inch pot will produce a good plant, but a size larger is preferable, and if very large plants are required an eight-inch pot can easily be filled by the larger ones before winter sets in. Primulas sometimes get what the older gardeners call water-pot fever; their susceptibility to overwatering is the only drawback to their cultivation, but this is easily overcome by a little care. A slight shade is necessary in the hot months of summer, and plenty of air while the nights keep warm.

South Lancaster, Mass. *E. O. Orpet.*

# Meetings of Societies.

## Nebraska State Horticultural Society.—II.

WE continue our report of the annual meeting of this society by giving abstracts of a few of the addresses and discussions on the cultivation of Cherries and Plums.

### THE CULTIVATION OF PLUMS.

Mr. E. S. Hartley's experience with this fruit may be summed up as follows: "The first crop I marketed paid the entire cost of my Plum orchard up to that date." He thought that this fruit offered a more promising field for experiment than most other branches of pomology. He had fruited two hundred seedlings, and the result showed a marked tendency among American Plums to vary. We give condensed extracts from Mr. Hartley's address:

In 1888 I planted 240 trees, but many of them were untrue to name, and therefore my venture has proved less satisfactory than it should have been. However, 140 trees bore full crops last season, six years after planting, and we marketed them at an average price of $1.50 a bushel, or at the rate of $150 an acre. Plum pockets began to appear about the time of blossoming, but these were hand-picked and burned. Sprouts were gotten rid of by horse-power, an attachment having been made for the cultivator which shaved them off about an inch and a half or two inches below the surface. By another device the plums were conveyed to the marketing boxes without touching them with the hands, the whole crop of a tree being transferred to the boxes in about ten minutes. This device consisted of a canvas buttoned about the tree into which the plums were shaken, somewhat on the principle of the Cook apple-harvester.

One of the chief difficulties in estimating the value of new varieties is to determine the influence of the stock upon the cion, which seems to be very marked in the case of the Plum, both in the quality of the fruit and the abundance of the product. For instance, De Soto on Miner stock has proved weak and barren, and seems to lack nutrition. The same variety on roots of Prunus Americana is very productive, and a healthier tree. Varieties of Americana and Chickasaw have been reported to do well on Peach stocks. Myrobalan, Marianna and the Sand Cherry, as stocks, are alternately praised and condemned, according to the cions which are put into them. For this reason it seems necessary to plant the same Plums on different stocks until their effect is better understood.

The improvement of the native Plums is still in its infancy, as compared with the development of other fruits. I believe the possibilities here are very great, both in the improvement by selection, natural pollination and artificial hybridizing between native varieties and European and Japanese varieties. The time is not far distant when the plum will outrank the cherry as a useful and popular fruit, and rival the peach and pear in popularity. We are in a region specially favorable for the development and growth of the Plum. The seasons of 1893 and 1894 have demonstrated the ability of the Plum to withstand drought exceptionally well. The driest year known in in this section of the country has produced the largest crop of

plums. In the effort to improve our Plums by cross-breeding we will doubtless achieve better results by resorting to the Japanese varieties, since they possess some desirable characteristics which the European Plums do not, particularly vigor and productiveness. So far as tested, these Japanese varieties give satisfaction in the west. Some of them have withstood a temperature of thirty-seven degrees below zero at Geneva, Nebraska, without the slightest injury. By watching them side by side with our hardy natives the past four years and witnessing their splendid behavior, I have been forced to the conclusion that there is a close relation between our natives and these Japanese introductions. In their large size and fine qualities lie the condensed improvements brought about by, perhaps, thousands of years of selection, while our natives have been left to improve under the operation of the law of "the survival of the fittest."

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In the discussion that followed, Professor Hansen, of the Iowa Agricultural College, called attention to the fact that the Japanese varieties bloom so early that they are often caught by a frost which other varieties may escape. Burbank is the hardiest Japanese variety at Ames. Of the east European varieties, Moldovka and Voronesh Yellow are doing finely. Wyant is the most reliable native sort. At the college they propagate all Pears and Plums by side-grafting at the collar during the winter.

Mr. Masters called attention to the fact that the budding season of the Americana stock can be lengthened by cutting off about half of the top when the bark begins to set. Then, when the new sprouts begin to start, the budding can be continued without difficulty. This point is important since one of the great objections to this stock is that its season of budding is so short. Nurserymen seem to agree that there is not a satisfactory stock for the Plum in general use, and they are anxiously waiting for something better than they now have.

EXPERIENCE WITH CHERRIES.

President F. F. Stephens stated that he had planted somewhat freely for the last twenty years, and had not succeeded in raising a bushel of sweet cherries, though he had planted a great many varieties. Napoleon Bigarreau has seemed the healthiest of the sweet varieties, but only one tree remains sound, and, while that blossoms freely, it has not yielded fruit, though the tree is five or six inches in diameter. Neither have the Dukes given success, although the May Duke has come near to succeeding. These trees remained alive till they were six inches in diameter, but the birds invariably gathered the fruit. They are at work earlier in the morning than he is, and begin to pick as soon as the fruit colors. The gentleman of leisure may protect his fruit by covering the tree with netting, but whether this will ever pay on a commercial scale at Nebraska prices is doubtful. It seems wiser to plant enough for the birds, our neighbors and ourselves, and this planting should be of varieties that yield abundantly and ripen in a comparatively short time. In 1891, in Mr. Stephens' orchard, it took 100 bushels to feed the pickers and the birds, or one-eighth of his crop of 800 bushels, yet he dare not dispense with the birds lest a worse trouble come upon him, for in the rapid increase of insects the birds will doubtless fully repay for the toll they take from our fruits.

In varieties the Early Richmond easily leads all others. The quality of Late Richmond is good, but it fails in productiveness. In place of this the large Montmorency is recommended, with the Ostheim and English Morello. The latter, however, like all late cherries, is less desirable, owing to its longer ripening period and consequent greater injury from birds. The Russian varieties seem to be open to the same objection, and, in addition, are lighter yielders. They are hardier in tree and bud, however, and may prove valuable for the north-western part of the state. The Vladimir cherries reproduce themselves from seed, and are likely to prove valuable in especially trying localities.

Good growth and abundant feeding make a marked difference in the quality of the fruit. Even the Early Richmond, when receiving high cultivation, and heavy manuring after it comes into bearing freely, becomes a larger and much richer cherry, and would hardly be recognized as the Early Richmond. Deep plowing before planting, steady surface cultivation in the orchard and heavy surface manuring after the trees come into bearing will improve any of our varieties in a surprising degree.

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Mr. D. N. Reed, of Blue Springs, Nebraska, has a Cherry orchard of seventy-four trees. The first Richmonds ripened about June 1st, and a crop of 2,160 quarts was marketed from fifty-four trees, or an average of forty quarts a tree. The remainder of the orchard gave an average of thirty quarts a tree, making the total yield from the seventy-four trees 2,660 quarts, which found a ready sale at eight and one-third cents a quart, or $212.80. One acre planted to Cherry-trees sixteen feet apart requires 170 trees, and, using the yield for 1894, would give in value $488.75 an acre. With the varieties now fruiting Mr. Reed has ripe fruit on the trees for about two months. The best variety in quality, by all odds, is the one supposed to be Early Morello. This ripens three or four days after the first Early Richmond; is a black cherry; meat and stone colored red to the seed. It commands a ready sale, customers asking for the black cherry. The tree is a good grower and as prolific as Early Richmond, and fully as hardy on our grounds. Next in quality and season is Large Montmorency, closing up the gap between Early Richmond and English Morello. This is a better cherry for eating from the tree than Early Richmond; as good a grower and as prolific. Mr. Reed also finds this fruit to respond quite as promptly to good cultivation as any other fruit, and more certainly than most fruits. The last two summers have proved—in Nebraska and Iowa, at least—that orchards must be cultivated to keep in health, and thus get growth of wood and fruit-buds; for without wood-growth there will be but few buds. That cultivation is the next thing to rain was demonstrated in many instances last year.

Mr. Peter Youngers said that by planting Dye House, Early Richmond, Early Morello, Large Montmorency, Ostheim, English Morello and Wragg a constant succession of fruit may be obtained in Nebraska from June 5th to August 5th—two full months of ripe cherries. This list, compared with one made in 1874, is remarkable; at that time the Early Richmond was the only Cherry considered safe to plant. But the cause of horticulture has advanced in twenty years until, instead of one variety, two full months of this wholesome fruit can be had. And with the new additions from Russia and Germany, together with the new seedlings that are now in process of development, Mr. Youngers felt assured that the gain in the future would equal that of the past, and when the list of the best market sorts of cherries is called for twenty years from now it will cause the old members of the Nebraska Horticultural Society to feel that they were not born in the cherry age.

Professor Hansen considers the Mazzard to be far the best stock for the Cherry, notwithstanding the fact that the Mahaleb is the one almost wholly used throughout the west. The cherries with colored juice, especially, do not succeed well on the Mahaleb stock. There seems to have been a general fear of the Mazzard stock on account of its sprouting, which is, perhaps, aided by the nurserymen, since they find the Mahaleb the most convenient stock to work. The Sand Cherry has proved a failure as a stock for the Cherry, but is a good stock for the Japanese Plums. It seems to be more closely allied to the Plums than to the Cherries.

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## Western New York Horticultural Society.—II.

THE following is a continuation of our report of the annual meeting of this society:

HOME-MIXED FERTILIZERS.

Dr. Caldwell, of Cornell University, in an address on this subject, said that a "cheap thing" in fertilizers was quite as unsatisfactory as other cheap things. The composition of commercial fertilizers is usually given in per cent. Available fertility is rated by units in the trade, and a unit is twenty pounds, so that the figure denoting the per cent. gives us the number of units of the potash, phosphoric acid or nitrogen in a ton. The price of a unit is twenty times the price of a pound, which means for nitrogen $3.50, for phosphoric acid $1.30, and for potash $1.00. Most of the cheaper grades of fertilizers are sold for more than they are worth, while the better grades are sold at their actual value, or a trifle under. In New Jersey last year 700 tons were home mixed at an average cost of $29.70 a ton, and an average value of $49.27. The farmers bought high-grade fertilizers intelligently, not hit or miss. The average cost of a pound of nitrogen, phosphoric acid and potash respectively, in the home-mixed fertilizers, was 14.9 cents, 5.7 cents and 4 cents, while in manufactured goods it cost 24.8 cents, 9.4 cents and 6.7 cents. The available food was 436 pounds to the ton in the home-made fertilizer, and only 299 pounds in the manufactured.

The manufacturer claims that he can do the mixing better than the farmer. The farmer can buy the goods ground as finely as he wants and mix them as thoroughly as the manufacturer, as is shown by the comparison of twelve samples of manufactured articles with ten of home-mixed. The impor-

tance of thorough mixing depends on the solubility of the plant-food. If the water dissolves it as soon as it goes into the soil, then that distributes it more efficiently than can be done in any other way. This solubility affects the nitrogen most, and this is the constituent which the manufacturers claim they can furnish in better condition than the farmers can. In the home-made fertilizers seventy-two per cent. of the nitrogen was available, while only twenty-eight per cent. was available in the manufactured fertilizers. Of the home-mixed material only twenty-eight per cent. needed to be made fine and mixed thoroughly, while in the manufactured article seventy-two per cent. required such treatment. Sixty per cent. of the price of average fertilizers is paid for nitrogen. By the proper growing of certain Leguminous crops much of this may be saved.

The farmers of New Jersey who have been doing so much of this home-mixing feel satisfied that the results are better and cost less than their former practice. Of course, each man must experiment on his own land by excluding one plant nutrient and thus ask if his land wants this, that or the other of these three important constituents. It is bad practice to be stingy with applications of fertilizers. It should be remembered that there are three and a half million pounds of soil on an acre, taking one foot in depth, and then one can estimate how small an amount of food 700 pounds to 1,000 pounds of fertilizer will furnish when it contains only five per cent. of nitrogen, ten to fifteen per cent. of phosphoric acid, and ten per cent. of potash.

### THE EVOLUTION OF TILLAGE.

Professor Bailey began his address on this subject with the statement that tillage, as we understand it, was not known till two hundred or three hundred years ago. The physical necessities of killing weeds, putting in the seeds and getting the crops out was all that was aimed at. Two hundred years ago Tull observed the tillage of vineyards in the south of France, and as a result published a book in 1733 known as *Horse-hoeing Husbandry*. His theories were that by tillage soils might be forever reinvigorated and renewed. Some thought the necessary elements for plant-growth were nitre, water, air, fire and earth. Tull ruled out the air. He said that the plant is earth. He thought they fed on earth, and hence it was necessary that it should be finely divided, so it might be taken up by the mouths of the roots. The value of ashes was entirely due to their fineness. He observed also that tillage made the soil moist. He thought the moisture came from the air.

We have now learned to till for the sake of tillage. At Cornell, Tull's system of growing Wheat in rows and cultivating has been followed by taking a piece of ground and dividing it into strips five and a half feet wide and planting alternate strips each year with Wheat, and keeping the vacant land cultivated. The result is as heavy crops as the average ones of New York state the last five years on the same piece of ground.

By failing to cultivate well, farmers are borrowing money when they already have a lot in bank not drawing interest.

The failure of apples is due to the neglect orchardists have shown for the last twenty-five years, and now they are reaping the harvest. They should use the deposit in the bank first; get the most possible out of the land by tillage. Some hold three or four years of such treatment to mean failure afterward. But we need not expect to correct the wrongs of a quarter of a century in three or four years. Nine-tenths of all the orchards in New York are in grass, and half of these yield annual crops of hay. We are hunting fungi with spray guns and forget to feed our crop-producers. If an orchard is worth planting it is worth caring for.

It is impossible to begin cultivating an old orchard because the roots have come to the surface. In Erie County, on a light soil, one grower had plenty of berries in a dry year by keeping the soil in good condition by cultivation. He held the moisture from the rains by constant cultivating so as to interrupt and break the capillaries which drew the soil-water to the surface, where it evaporated and was lost, and at the same time he spread over the land a porous blanket two or three inches thick. In the Pecos Valley, now becoming famous, the yearly rainfall is five or six inches, but they keep it all by cultivation, and yet here we are complaining of trees shriveling and drying up with forty-eight inches rainfall.

All the growth of an orchard should be made by August. The rule should be to begin early, plow deep, and follow rains closely with a cultivator. He had found roots of two-year-old Plum-trees eight feet from the trunk, while the top only extended four feet, thus showing that the root extended farther than the top. In the early part of the season the tree-roots catch food, while later the trees should be checked by Crimson Clover, which takes the available food and moisture, and gathers food into a better shape for trees. It should be sown in August, but it ought to be either long before or after the fruit is gathered.

Pruning is a means of tillage; it concentrates food in a short space. After all this has been done, then spray. When an orchard in sod is doing well it merely shows that the land there has superabundant fertility. Half of the old orchards should be cut down. Those which cannot be plowed should be dragged and have an application of 500 pounds of superphosphate and half as much potassium chloride to the acre. Feed the crops, not the land; apply 200 pounds every year, not half a ton every five years.

In the discussion which followed this paper, Mr. Tabor suggested that cultivation may stimulate the production of trees, rather than of fruit, tending to push the tree with the greater amount of nitrogen it secured as food. An orchard in Dutchess County was thoroughly cultivated and dressed with 1,500 pounds of bone and 500 pounds potassium chloride. Another had a good dressing of stable-manure. The orchard treated with potash and bone gave glossy, firm, high-colored apples, while the one dressed with barnyard-manure gave larger, but less highly colored, apples, which shrank more, and did not carry to England as well. He thought the nitrogenous manure keeps the wood growing late, so that it does not ripen well, and immature buds mean poor fruit. To this Professor Bailey replied that he would supply potash and phosphoric acid, but would not buy nitrogen. Sometimes, when lands are rich in nitrogen, and an orchard is too rankly growing, then seeding it down to grass might be its salvation. This, however, is a special case; as a rule, cultivation is better than grass.

### A THOUSAND DOLLARS AN ACRE FROM BLACKBERRIES.

This was the rather startling title of a paper read by Mr. C. E. Chapman, of Peru. In recounting his experience Mr. Chapman said that he had heard that Blackberries would grow anywhere, and he, therefore, bought some plants of Kittatiny, took no particular pains to set them, and many died. He used on the ground a quantity of raw, coarse manure, and the next year many of the canes broke. He then concluded that to grow Blackberries required some study. As a result of the study he prepared a piece of chestnut loam, put it in prime condition, bought some plants of Agawam and Snyder from good, careful growers, at prices that would warrant him in expecting good plants. He set them carefully in trenches seven feet apart and eight inches deep in the trench. He found these varieties deep-rooted and thrifty, and where mulched, pruned and not fed too much raw manure he had little trouble from winter-killing. When setting his plantation he applied eight hundred pounds of potash to the acre. He was careful to have all plants well set, and he frequently clipped the tops. All weak canes were cut out. Every spring he applies a light dressing of commercial fertilizer. Immediately after fruiting he cuts out and destroys all the old canes, as these are the seat of nearly all the troubles of this fruit. During the winter he mulches heavily and leaves the mulch on late in the spring to prevent early starting.

Although he did not believe a thousand dollars an acre could be realized under ordinary conditions, yet this was an achievement worth striving for, and small patches had been made to yield at that rate. It required the right combination of man, soil, variety and cultivation, but it could be done.

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Crimson Clover was much talked of at this meeting, as it always is nowadays at any gathering of farmers or fruit-growers, and it was suggested as the best crop to cover the ground in winter and catch nitrogen, because it will grow all through the winter and be ready to plow under in the spring. There is danger of its dying as far north as New York state, according to Professor Waite, who said it had been killed out near Washington by a temperature of six degrees below zero. This may have been due, however, to the warm weather preceding it. Professor Bailey said it had not been winter-killed in New York during the last three years when raised from home-grown seed. Dr. Caldwell spoke of it as a quick-meal crop, and valuable because it worked when nothing else could, and his advice was to secure nitrogen by some leguminous crops, and apply phosphoric acid and potash, trying every possible combination. The nitrogen in dried blood or in bone-meal could be used any time in the year, but sodium nitrate could only be applied about the time of sowing or after a crop was under way, so that it could be taken up at once by the plants before it leached out and ran to waste.

## Notes.

Between sixty thousand and seventy thousand bulbs of Japanese Lilies were disposed of at a single auction sale in London last month.

Mr. J. H. Hale writes to the *Florists' Exchange* of a new large winter pear in form like Vicar, but with a color as beautiful as that of the Bartlett and of quite as good flavor. The stock is owned by E. G. Mendenhall, Kinmundy, Illinois. A really first-class winter pear of this color and description would be a desirable acquisition.

A correspondent of the *Rural New Yorker* writes that after freezing weather set in last fall he planted all his Cauliflowers which had not headed in a trench and covered them with leaves. They continued to grow. Now the leaves are as green and crisp as they were in September, and every plant has formed a fine head. There seems to be no reason why Cabbage and Cauliflower which have not matured in autumn should be allowed to waste.

At the late meeting of the Royal Horticultural Society, in London, Mr. May's new Tea Rose, Mrs. Pierpont Morgan, which we have already described as a sport of Madame Cusin, received an award of merit. The fragrance of the flower was spoken of as one of its distinct features and as delightful as that of any Tea Rose known. It certainly speaks well for the flower that it preserved its fragrance after a journey across the Atlantic before it was exhibited.

At the late meeting of the American Pomological Society at Sacramento the Wilder silver medals were awarded: To the Coöperative Fruit Company of Newcastle, Placer County, California, for oranges, lemons, pomelos, Japanese persimmons, apples, figs and almonds; to the California Nursery Company, for sixteen varieties of olives on branches. Bronze medals were awarded to the Pioneer Land Company, Porterville, for ten varieties of oranges, pomelos and limes; to P. C. Drescher, of Palermo, for sixteen varieties of oranges; to the Horticultural Society of Sonoma, for Luther Burbank's improved nuts and other fruits.

An English traveler in northern Russia writes to the *Gardeners' Chronicle* that nothing surprised him more than the universal presence of well-grown flowering plants in dwelling-rooms. Even in the cells of monasteries and in the studios of city photographers farther north than Archangel he found such plants as Oleanders, Crotons, Pelargoniums and Fuchsias in almost every room. The double windows, so necessary to keep out the cold, have a draught-tight space between them filled with flowering plants, and it does not seem necessary to open them for air during the short hot summer. From September to June the country is buried in snow and shut in by ice. The average temperature for January is only ten degrees. The July temperature, however, has an average of sixty degrees, Fahrenheit, which is hardly to be wondered at when it is remembered that the sun shines twenty-two hours out of the twenty-four.

Mr. Thomas Meehan, in the last number of his *Monthly*, which contains a portrait of Aquilegia Canadensis, gives a very pretty description of a scene in spring along the Wissahickon, in which this wild Columbine was an important feature. It was twenty-five years ago, before the city, with its army of flower-gatherers, had crowded so far out into the country, when this plant was seen among the loose rocks at the base of a huge crag with blue Hepaticas, Spring Beauties and the snowy flowers of Blood-root mingled with the vivid color of the evergreen Fern, Aspidium acrostichoides. Up in the crevices of the crag Corydalis glauca was blooming profusely in the midst of tufts of common Polypody, while the trees and shrubs were just beginning to open their tender leaves, making a sort of half-shade which gives that peculiar charm to forest-scenery at this entrancing season of the year. The final charm to the scene was given by our wild Columbine, whose woody roots had descended deeply in the crevices of the rocks, where the leaves had been caught, to decay and make the rich food in which it delights. Why do not these plants make a nice list for a nook in some wild rock-garden for early spring effect?

We have heretofore given accounts of experiments to test the influence of electric light on plants growing in the greenhouse. The most important of these experiments were conducted by Professor Bailey, in which the arc lamp was used. In 1892 Professor Rane, of the West Virginia Agricultural Experiment Station, began some tests with incandescent lamps, although in the bulletin which recounts these experiments it is stated that in the arc light the chemical rays predominate, while in the incandescent light these are only slightly present, and the supposition is that the light from an arc lamp contains properties which render it nearer sunlight in quality than that of the incandescent lamp. The results produced in the seasons of 1892 and 1893 were that the electric light had a marked effect on greenhouse plants, and appeared to be beneficial to such as are grown for their foliage, as, for example, Lettuce, which was earlier, weighed more and stood more erect. Flowering plants also blossomed earlier and continued in bloom longer under light, and most plants tended toward a taller growth. The influence of the light was objectionable in some plants, such as Spinach and Endive, as it forced them to run quickly to seed. The stronger the candle-power the more marked were the results.

Just now the stores of the retail florists are bright with an unusual number of cut flowers of different kinds, which show a wide variety of color. Single red tulips sell for $1.00 a dozen, the more popular pink and yellow sorts commanding as much as $1.25, while the double yellows cost $1.50 a dozen, which is also the price asked for the few double pink tulips that have appeared. Other flowers of bulbous plants are single hyacinths at seventy-five cents a dozen, the limited supply of double hyacinths bringing thirty-five cents a stalk. Poet's narcissus are occasionally seen, and these sell for $1.00 a dozen. Paper-white narcissus, yellow jonquils and freesias are seen in many collections. Well-grown lilacs, with luxuriant foliage, cost $1.50 to $2.00 for a bunch of ten to twelve single sprays for the purple flowers, and the white lilacs bring $2.00 to $3.00. The best carnations and a fair grade of mignonette cost $1.50 a dozen. A bunch of two dozen sprays of forget-me-nots may be had for $1.00, and half this quantity of lily-of-the-valley costs seventy-five cents. Roses are in great abundance, and vary in price, according to the quality, a great many of them being of more than average excellence. Good flowers of Madame Cusin bring $2.00 a dozen, while the same grade of Bridesmaid, Bride, Catherine Mermet and Meteor sells for $2.50 to $3.00, and the better grades of any of these roses command $5.00 and $6.00 a dozen, and even more. American Beauties, with stems five feet long, bring $1.00 apiece and upward. Cattleyas sell for $9.00 a dozen and upward, and white varieties bring twice as much. Cypripediums are scarce, and cost $4.00 to $5.00 a dozen.

On page 344 of the last volume of this journal, Professor J. B. Smith, of New Jersey, gave an account of the way in which the San José scale was being brought into the eastern markets upon pears and, perhaps, on other fruits. In the last bulletin from the New Jersey Experiment Station, Professor Smith gives an account of the spread of this scale in New Jersey, where it was introduced upon Kelsey Plum-trees imported from California, and probably from Idaho Pear-stock received from western nurseries, and it has spread until it is known to have infested at least a hundred places in that state, and it is not safe to assume that it is absent from any orchard which has not been examined. This scale belongs to the group of armored scale insects, and a complete account of its life history and of its methods of spreading are given in this bulletin. Naturally it moves very slowly, but as it will crawl upon winged insects and the feet of birds, as well as upon ants, which are great travelers, it is sometimes carried great distances. It is probable that all Rosaceous plants will support the species, although it prefers some varieties to others. The recommendations in the bulletin are that every orchard set out during the last six years should be thoroughly examined, and if the scale is found to be present and confined to a few trees these trees should be taken out and destroyed, unless the infestation is slight, so that they can be gone over with a stiff brush and all the scales actually brushed off. In young orchards where the trees are not too large to handle it will pay to go over all the trees with a brush. Where the trees are too numerous or large they should be pruned back, removing as much wood as the tree can spare; the cuttings should be carted off and burned, and the tree should be washed with a potash solution. In California the insect is treated with gas which is formed by the action of diluted sulphuric acid on fused cyanide of potassium. This is not recommended for eastern orchards as the necessary outfit is too expensive, but wherever stock is infested in nurseries, or even suspected of infestation, all trees sent out should be made up in bundles with the roots wrapped to retain the moisture, covered with oiled canvas or other gas-tight material and fumigated for an hour, an ounce of cyanide to every one hundred and fifty cubic feet of space being used. This bulletin is worth careful study by all fruit-growers, since the San José scale is one of the most dangerous insects introduced into the eastern states within recent years, and no fruit-grower ought to consider the matter so unimportant that he can afford to neglect it.